(2)

USAFOEHL REPORT

88-095EQ0079FEF

EMISSION TESTING OF HOSPITAL PATHOLOGICAL INCINERATOR, GRIFFISS AFB NY

MARY M. DALY, Captain, USAF, BSC

July 1988

Final Report

USAF Occupational and Environmental Health Laboratory
Human Systems Division (AFSC)
Brooks Air Force Base, Texas 78235-5501

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS NA
2a. SECURITY CLASSIFICATION AUTHORITY NA	3. DISTRIBUTION / AVAILABILITY OF REPORT Distribution is unlimited; approved for public release
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE NA	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) USAFOEHL Report 88-095EQ0079FEF	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION USAF Occupational and Environmental Health Laboratory 6b. OFFICE SYMBOL (If applicable) ECQ	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Brooks AFB TX 78235-5501	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION Same as 6a 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO

11. TITLE (Include Security Classification)

Emission Testing of Hospital Pathological Incinerator Griffiss AFB NY

12. PERSONAL AUTHOR(S) Capt Mary M. Daly

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM 11 TO 11 Dec 87	July 1988	81

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Stack Sampling, Emission Testing, Incinerator, Stack Emission(s), Pathological Incinerator

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

At the request of HQ SAC/SGPB, personnel from the USAFOEHL conducted an air emission survey of the exhaust from the hospital pathological incinerator at Griffiss AFB NY on 11 Dec 88. The survey results show that the facility is in compliance with the State of New York emission standards for particulate matter. The State has proposed revisions to the existing regulations and survey results show that the particulate and hydrogen chloride proposed emission standards would be met. The proposed regulations for minimum temperature values in the primary and secondary chambers would not be met.

The facility is in compliance with the existing particulate matter standards and no further action is required. The facility is not in compliance with the proposed standards due to the temperatures in the primary and secondary chambers. Action is recommended to correct this situation, although, based on the proposed revision to the regulations, compliance will not be required until January 1, 1992.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL Capt Mary M. Daly	22b. TELEPHONE (Include Area Code) (512) 536-2891 22c. OFFICE SYMBOL ECQ

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

CONTENTS

Illustrations

Table

I. INTRODUCTION

On 11 Dec 87, source emission testing for particulate and hydrogen chloride (HCl) emissions was conducted on the USAF Hospital pathological incinerator at Griffiss AFB by personnel from the Air Quality Function of the USAF Occupational and Environmental Health Laboratory (USAFOEHL). This survey was requested by HQ SAC/SGPB to determine compliance with proposed New York State interim standards for medical care facility waste incinerators. Personnel involved with on-site testing are listed in Appendix A.

II. DISCUSSION

A. Background

The New York Department of Environmental Conservation (NYSDEC) has become concerned about the environmental impact of transportation, storage and disposal of hospital waste. NYSDEC is interested in the incineration of hospital wastes because of the increasing amounts of plastics in the wastes. Many of the plastics are chlorinated and when incinerated, produce toxic emissions containing hydrochloric acid and possibly traces of chlorinated organic compounds. The existing state air regulations address particulate emission and opacity but not toxic emissions. An in-house test program is being considered by the state to characterize the emissions from selected medical waste incinerators and evaluate their risk. The technical data gathered by the state will be used to revise current air laws for toxic emissions. The NYSDEC has proposed revisions to the incinerator emission standards (See Appendix B). These revisions, or similar ones, are expected to be adopted by late summer 1988. According to the proposed revisions, the facility must comply with requirements by January 1, 1992.

B. Site Description

The pathological waste incinerator is located in a small room on the top floor of the hospital with the exhaust stack extending through the roof. A photograph of the exhaust stack is shown in Figure 1. The incinerator was manufactured by Joseph Goder (Model 1500) and was designed for Type 4 waste (defined as human and animal solid refuse consisting of carcasses and organs from hospitals, laboratories, and slaughterhouses). This company, formerly located in the Chicago, Illinois area, has gone out of business. The unit does not have any air pollution control equipment and has the following operational parameters:

(1) two-chamber design

(2) fired by liquid petroleum (LP) gas

(3) load capacity of 50 pounds per hour (lb/hr)

The incinerator is operated on a batch cycle at about 20 lb per burn. The burn time is approximately one hour. Approximately one batch of waste is burned each week.

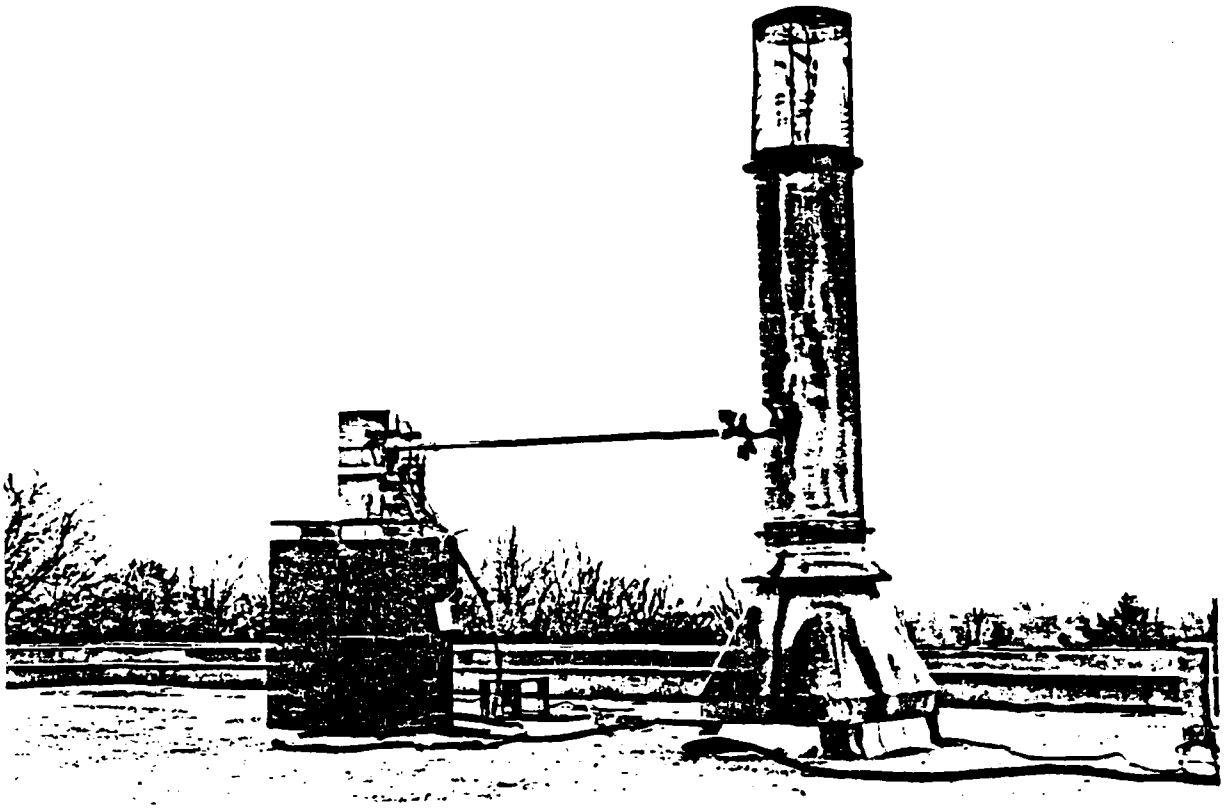


Figure 1: Pathological Incinerator Facility

C. Applicable Standards

The monitoring requirements and regulations for opacity and particulate emissions are defined under Codes, Rules and Regulations of the State of New York, Title 6, Chapter III - Air Resources, Subchapter A - Prevention and Control of Air Contamination and Air Pollution, Part 219. The existing emission standards for incinerators having a loading rate of 2000 lb/hr or less are presented in Appendix C. Incinerators with loading rates less than 100 lb/hr are set at the 100 lb/hr standard. The following values are not to be exceeded during normal operation:

(1) particulate emissions: 0.30 lb/hr

(2) opacity: 20% or No. 1 on the Ringleman Chart

The NYSDEC proposed revisions to its incinerator regulations are:

(1) particulate emissions: not to exceed 0.015 grains per dry standard cubic foot (gr/dscf) at 7% oxygen (O_2).

(2) opacity: six minute average less that 10%.

(3) hydrogen chloride: less than four pounds per hour with the total charging rate less than 500 pounds per hour.

(4) secondary chamber temperature designed for 1800 degrees Fahrenheit (°F) and minimum residence time of one second; primary chamber must be maintained at no less than 1400°F.

(5) carbon monoxide: hourly average less than 100 parts per million by volume.

D. Sampling Methods and Procedures

The present regulations and proposed revisions require that all emissions tests be conducted in accordance with the procedures and analysis methods specified in 40 CFR 60, Appendix A, Methods 1-5. Therefore, test methods, equipment, sample train preparations, sampling and recovery, calibration requirements and quality assurance were done in accordance with the methods and procedures outlined in 40 CFR 60, Appendix A.

Two sampling ports were installed at right angles in the stack resulting in two traverses of the stack cross-section. These ports were installed four diameters upstream from the stack exit and 12 stack diameters downstream from any disturbance (exit from incinerator). Based on these distances to disturbances and a stack diameter of 11.5 inches, eight traverse points (four per traverse) were sampled. The total sampling time was 64 minutes with eight minutes per point. The test consisted of three 64 minute samples. Since there were small fluctuations in the stack velocity pressure over the eight minute sampling time, the operating parameters were recorded and sampling velocity was reajusted as needed every four minutes. Appendix D shows port locations and sampling points.

Prior to sampling each stack, a preliminary velocity pressure traverse was accomplished and cyclonic flow was determined. For acceptable flow conditions to exist in a stack, the average of the absolute value of the flow angle taken at each traverse point must be less than or equal to 20%. The flow angle in the stack averaged less than 4 degrees which indicated an acceptable flow condition.

During each sample run, the molecular weight of the exhaust gas was evaluated using the Orsat. Orsat sampling and analysis equipment are shown in Figures 2 and 3. Exhaust gas moisture content, also needed for determination of gas molecular weight, was obtained during particulate sampling.

Samples were collected using the sampling train shown in Figure 4. The train consisted of the probe, the sampling box and the meter box. The probe consisted of a button-hook probe nozzle, heated inconel probe, and a type "S" pitot tube to measure velocity pressure in the exhaust stack. Particulate matter is gravimetricaly sampled and to avoid particle size biasing, the sampling velocity must be within 10% of the stack velocity. This is known as isokinetic sampling. The nozzle was sized prior to each sample run to insure isokinetic sampling. The probe and stack temperature were measured using Type K thermocouples. The sampling box consists of the hot box which contains the filter (maintained at about 250°F) and the condenser box which contains four impingers in an ice bath. The first two impingers contained a dilute

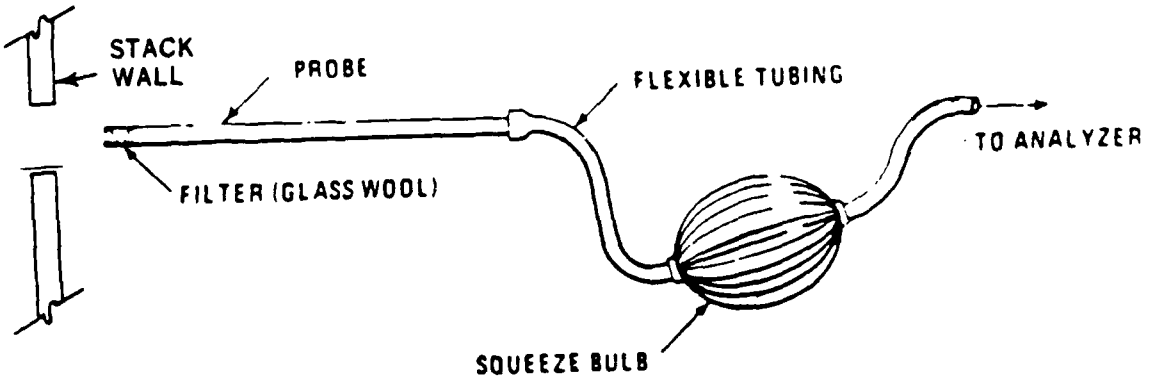


Figure 2: Orsat Sampling Equipment

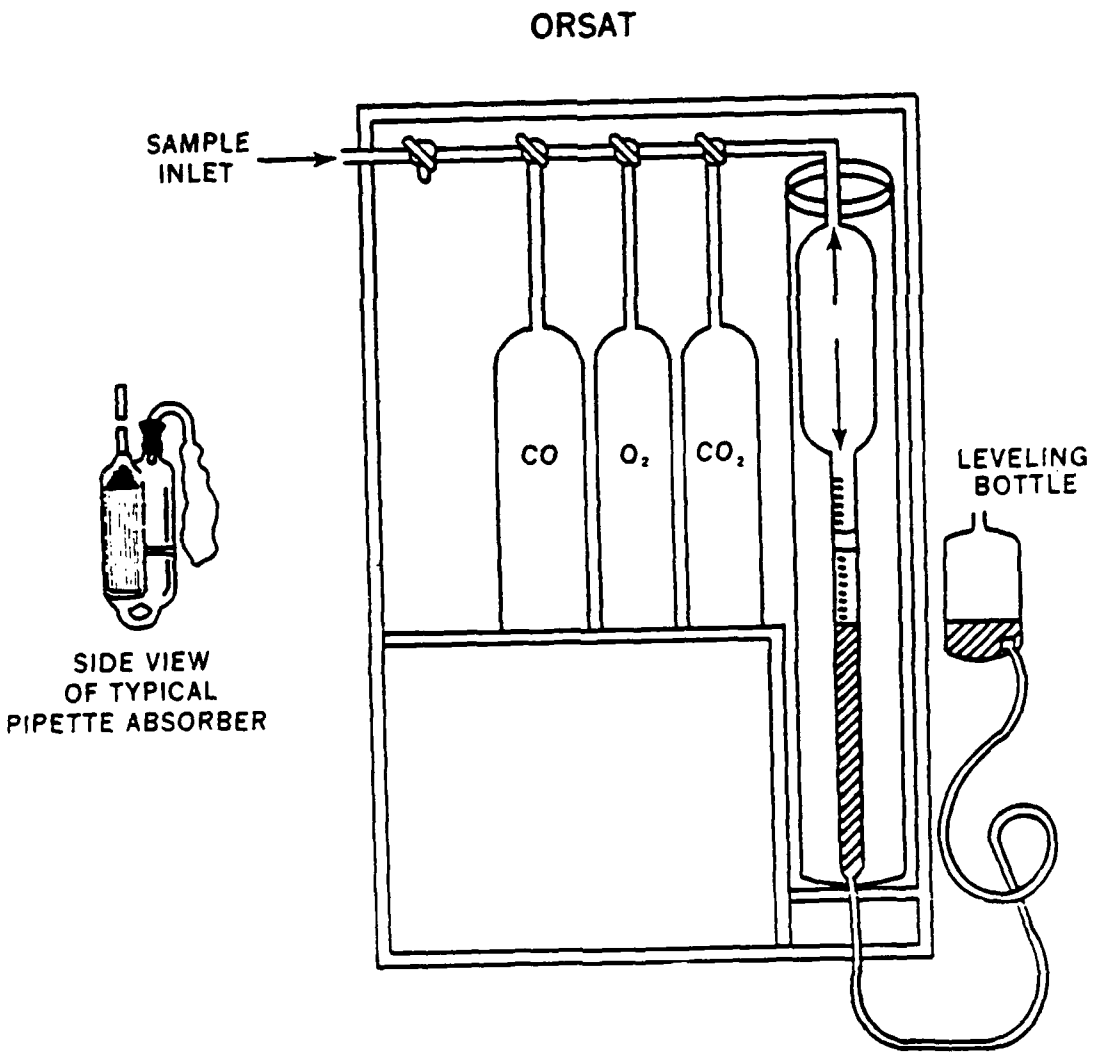


Figure 3: Orsat Molecular Weight Determination Equipment

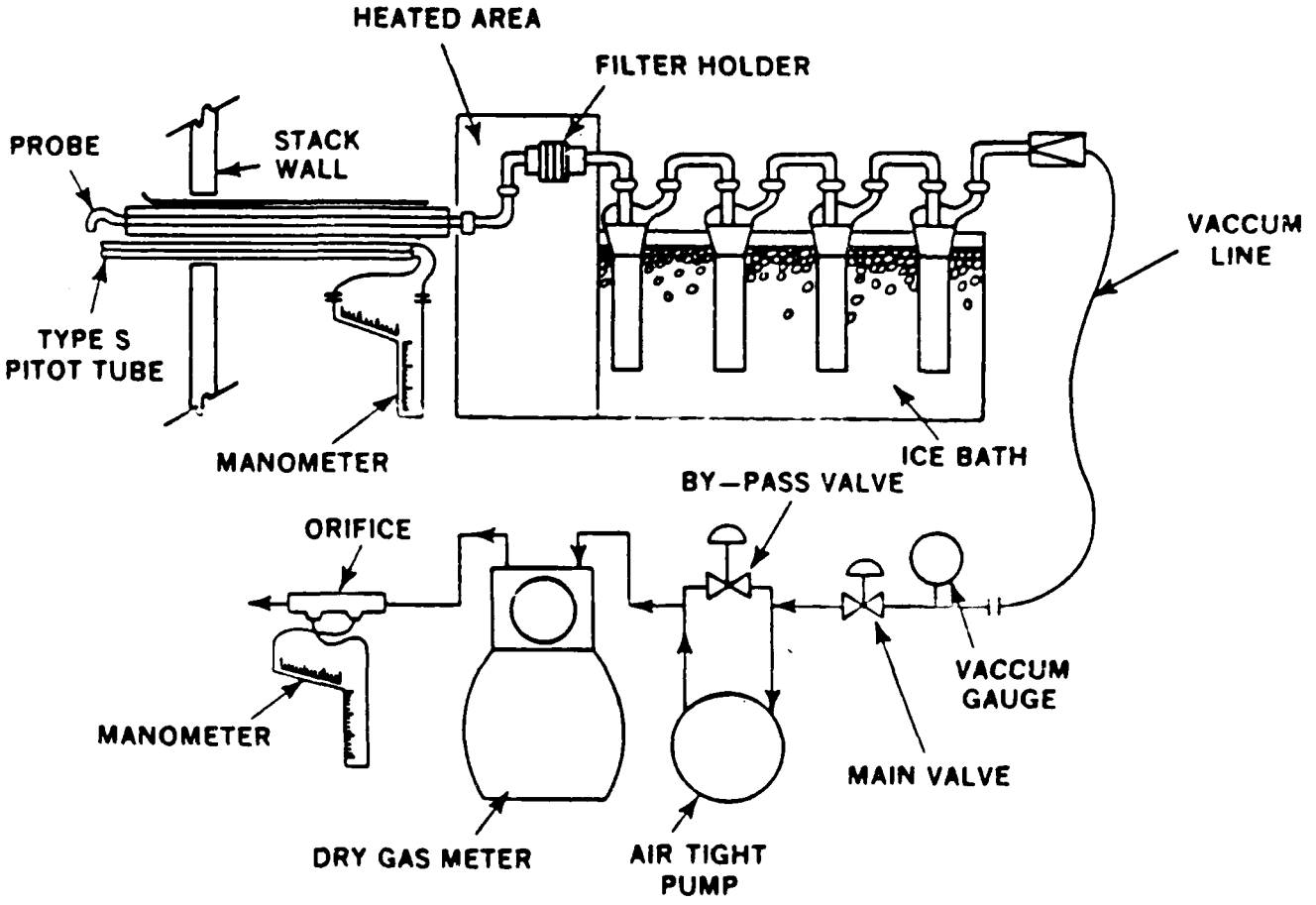


Figure 4: Sampling Train

sodium carbonate solution (0.1N) the third was empty and the last contained silica gel and were used to determine the moisture of the exhaust gas. The sodium carbonate in the first two impingers was used to collect HCl. The meter box contains the pump, dry gas meter, temperature gauges and two manometers (for the stack velocity pressure and the sample velocity pressure). The pump and dry gas meter were used to control and monitor the sample gas flow rate.

Emission calculations were done using two different methods. The "Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators" (EPA-340/1-85-018) was used on-site to determine nozzle size and sampling rate to insure isokinetic sampling. The second package, "Stack-Pack" was designed for a personal or minicomputer and provides results and calculations in a simple report format. All sampling data and resulting calculations from the Stack-Pack program are presented in Appendixes E-G. Calibration data are presented in Appendix H.

III. CONCLUSIONS

The emission survey results satisfied the existing emission standards for particulate matter and the proposed standards for particulate matter and hydrogen chloride. The proposed standards require certain operating temperatures in the primary and secondary chambers and these conditions were not satisfied. Since the dimensions of the secondary chamber were not available, the residence time in the secondary chamber could not be determined. The opacity and carbon monoxide were not determined during this survey since this was not a compliance testing and we were not requested to do these tests. The operating parameters for the incinerator during testing are shown in Table 1. Results indicate that the incinerator particulates emission and concentration values of 0.105 lb/hr and 0.008a gr/dscf at 7% 0_2 respectively, were well below the existing and proposed interim standards. Table 2 shows the resultant particulate emission rates determined from these tests. The hydrogen chloride emission rate of 0.331 pounds per hour was well below the proposed standard. Table 3 shows the hydrogen chloride emission rates found during the survey. The operating temperature of the secondary chamber and the loading rate throughout the sampling period are found in Appendix I. The secondary chamber temperature fluctuated between 1000 and 1700°F. The interim standard requires the incinerator secondary chamber be designed for 1800°F and a one second resident time. There are additional physical plant requirements such as an interlock system to control charging of wastes as a function of temperature and a continuous emission monitoring system. The details of these requirements are found in the proposed regulations (Appendix C). The incinerator doesn't have these systems, but existing facilities need not comply until January 1, 1992 if the present interim guidance is promulgated.

Table 1: Griffiss AFB Incinerator Operating Parameters

Type	Sample Run	Isokinetics Date	Stack Flow (%)	Loading Rate (dscfm)	(lb/hr)
pathological	1	11 Dec	99.5	665.96	13
	2	11 Dec	99.1	631.96	14
	3	11 Dec	98.4	629.47	23

Table 2: Griffiss AFB Incinerator Particulate Emission Results

Type	Run	0_2 (%)	Concentration uncorrected (gr/dscf)	Concentration corrected (gr/dscf) @ 7% 0_2	Emission (lb/hr)	Meet Standard exist/interim
Patho-	1	16.43	0.0247	0.0105	0.141	
logical	2	17.77	0.0155	0.0061	0.084	
	3	15.6	0.0169	0.0076	0.091	
AVERAGE		-	-	0.0081	0.105	Y / Y

Table 3: Griffiss AFB Incinerator Chloride Emission Results

Type	Run	Sample Catch (mg)	Stack Volume (dscf)	Conc (gr/dscf)	Flow (dscfm)	Emission (lb/hr)
Pathological	1	17	41.83	0.006	665.96	0.036
	2	220	39.55	0.086	631.96	0.465
	3	231	39.07	0.091	629.47	0.492
AVERAGE		-	-	0.061	-	0.331

where:

$$\text{conc} = \frac{\text{catch}}{\text{sample volume}} \times \frac{0.0154 \text{ grains}}{\text{mg}}$$

$$\text{emission} = \frac{\text{catch x stack flow}}{\text{sample volume}} \times \frac{60 \text{ minutes}}{\text{hr}} \times \frac{\text{pounds}}{(453.59 \times 10E^{3}) \text{ mg}}$$

IV. RECOMMENDATIONS

The hospital incinerator is in compliance with the existing particulate matter standards and no action is required at this time. The incinerator meets the proposed particulate and hydrogen chloride emission standards, however, it doesn't meet the secondary chamber temperature standards. In addition, the proposed revisions require systems such as interlocks and continuous emission monitoring. The results from this survey can be used to assess compliance with the values that will eventually be promulgated and determine future action as needed. Discussions with Mr Stowarz, Regional Air Engineer, NYSDEC, indicates the new standards, when promulgated, will be at least as stringent as the proposed revisions. We recommend an evaluation of the incinerator unit to determine compliance with the chamber temperature requirements and the interlock and continuous emission monitoring systems.

REFERENCES

1. Code of Federal Regulations, Vol 40, Parts 53-60, The Office of the Federal Register National Archives and Records Service, General Services Administration, Washington DC, July 1, 1987.

2. Quality Assurance Handbook for Air Pollution Measurement Systems - Volume III, Stationary Source Specific Methods, U.S. Environmental Protection Agency, EPA-600/4-77-027-b, Research Triangle Park, North Carolina, December 1984.

3. Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators, U.S. Environmental Protection Agency, EPA-340/1-85-018, Research Triangle Park, North Carolina, May 1987.

4. Booth, B.B. "Stack-Pack." Shasta County Air Quality Management District, Redding, CA

(This page left blank)

APPENDIX A

Test Participants

(This page left blank)

1. USAFOEHL Test Team

   Maj James Garrison, Chief, Air Quality Function

   Capt Mary Daly, Consultant, Air Quality Engineer

   2Lt Ronald Porte, Chemist

   A1C James Jarbeau, Industrial Hygiene Technician

   USAFOEHL/ECQ
   Brooks AFB TX 78235-5501

   Phone: AUTOVON 240-2891
   Commercial (512) 536-2891

2. Griffiss AFB On-site Representatives

Maj Lloyd Swartz	USAF Hospital Griffiss/SGPB
2Lt Carolyn Macola	AUTOVON 587-3617
Mr Herb Clark	USAF Hospital/SGALF
	AUTOVON 587-2181

3. State of New York Regional Air Pollution Control District (Region 6)

   Mr David Prosser (contacted by phone)
   Regional Air Pollution Control Engineer
   (315) 785-2513

4. New York State Department of Environmental Conservation

   Mr Michael Stawarz (contacted by phone)
   Regional Air Engineer
   (518) 623-3671 or 668-5441

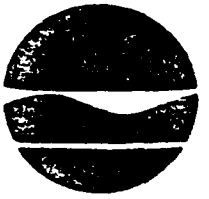
(This page left blank)

APPENDIX B

NYSDEC Memorandum/Proposed Revisions to Regulations

(This page left blank)

New York State Department of Environmental Conservation
Region 5 - Environmental Quality
Hudson Street, Warrensburg, NY 12885
(518) 623-3671 or 668-5441



Thomas C. Jorling
Commissioner

May 10, 1988

United States Air Force
OEHL/ECQ
Brooks AFB, Texas 78235-5501

Attn: Major Jim Garrison

RE: Proposed Revision to
Incinerator Regulations

Dear Major Garrison:

Per your request, enclosed is a copy of two subparts of the Department's proposed revision to its incinerator regulations. The entire incinerator package will be presented to the public for review and comment in the near future; by late summer these regulations, or ones similar to these, are expected to be adopted.

As soon as I have a complete copy of the entire proposal, I will forward one to you.

Sincerely,

D. A. Corliss, P.E.
Regional Engineer

Michael A. Stawarz

by: Michael A. Stawarz, P.E.
Regional Air Engineer

DAC:MAS:brd
Att.

EXPRESS TERMS

Adopt New Subpart 219-3

Infectious Waste Incineration Facilities

(Statutory authority: Environmental Conservation Law, Sections 3-0301, 19-0301, 19-0303, 19-0306)

Section

Section 219-3.1 Definitions. For the purpose of this Subpart, the definitions of Subpart 219-1 and Part 200 of this Title apply.

Section 219-3.2 Applicability and compliance dates. This Subpart applies to all new, modified and existing infectious waste incineration facilities including those used for the incineration of all medical waste and whose total permitted charging rate is less than 50 tons per day. Any new facility or modification for which an application for a permit to construct a source of air contamination is received by the department ninety or more days after the effective date of this Subpart must comply with the requirements of this Subpart before operation may commence. All other applicable facilities must comply with the requirements of this Subpart by January 1, 1992.

Any facility subject to this Subpart whose total permitted charging rate is 50 tons per day or more or which accepts municipal solid waste must also meet the requirements of Subpart 219-2.

Note: This Subpart alone does not require the incineration of any infectious or non-infectious waste. It only establishes the standards to be met if incineration is the chosen method of waste disposal. The requirement for incineration of infectious waste (as one treatment option) is found in PHL§ 1389-dd (for treatment at hospitals, residential health care facilities and clinical laboratories), in ECL § 15-1507 (for other treatment

facilities), in proposed solid waste regulations (6 NYCRR Subpart 360-10) and in Department of Health regulations (10 NYCRR 405.3 (b)(5) and 702.2(e)). If non-infectious waste is incinerated by choice, it must meet the requirements of Subpart 219-3 or 219-2.

Section 219-3.3 Particulate emissions. No person may cause or allow emissions of particulates into the outdoor atmosphere from any emission source located in a facility subject to this Subpart in excess of 0.015 grains per dry standard cubic foot of flue gas, corrected to seven percent oxygen.

Section 219-3.4 Hydrogen chloride emissions. No person may cause or allow a running three-hour average emission of hydrogen chloride from any incinerator at a facility subject to this Subpart in excess of 10 percent by weight of the uncontrolled emissions (90 percent reduction) unless it is demonstrated that the stack concentration is less than 50 parts per million by volume, dry basis, corrected to seven percent oxygen; or the uncontrolled emission rate is less than four pounds per hour and the total charging rate is less than 500 pounds per hour.

Section 219-3.5 Design requirements. (a) Furnace design must provide for a residence time for combustion gas of at least one second at no less than 1800 degrees F. For a multichamber incinerator, these parameters must be met after the primary combustion chamber and the primary combustion chamber temperature must be maintained at no less than 1400 degrees F, or

(b) Furnace design must provide a residence time for combustion gas and a temperature which, in combination, are shown to be equivalent to subdivision (a) of this section.

(c) Auxiliary burners must be designed to provide combustion chamber temperatures as described in subdivision (a) of this section by means of automatic modulating controls.

(d) Each incinerator must incorporate an interlock system which will:

(1) Prevent the charging of waste into the incinerator until the temperatures described in subdivision (a) of this section have been reached;

(2) Prevent recharging until each design burn cycle is complete; and

(3) Maintain the temperatures described in subdivision (a) of this section until all waste has been reduced to ash and carbon.

(e) Mechanically fed incinerators must incorporate an air lock system to prevent opening the incinerator to the room environment. The volume of the loading syster must be designed sc as to prevent overcharging to assure complete combustion of the waste.

(f) Control equipment for reducing emissions of hydrogen chloride must be designed such that the flue gas temperature at the outlet of the control device does not exceed 300 degrees F unless a demonstration is made that a greater collection of condensible matter can be achieved at a higher temperature.

Section 219-3.6 Operating requirements. (a) No person may cause or allow emissions to the outdoor atmosphere having a six-minute average opacity of 10 percent or greater from any emission source subject to these requirements.

(b) No person may cause or allow emissions of carbon monoxide to the outdoor atmosphere having an hourly average concentration in the flue gas exceeding 100 parts per million by volume, dry basis, corrected to seven percent oxygen.

(c) No person may operate a facility subject to this subpart unless the temperatures described in Section 219-3.5 are maintained.

(d) The commissioner must be notified in writing at least ten days prior to the commencement of operation of a new or modified incinerator subject to this Subpart.

Section 219-3.7 Other wastes. (a) Human and animal body parts of up to five percent of the permitted hourly charging rate for medical waste may be burned in an incinerator subject to this Subpart only if shown by test to be unidentifiable in the ash. The Certificate to Operate a source of air contamination will limit the amount of human and animal body parts that may be burned to the amount tested and found acceptable. Human and animal body parts exceeding five percent of the permitted hourly charging rate may be burned only in a crematorium permitted under Subparts 219-4, 219-5 and 219-6.

(b) Radioactive waste, whether decayed or not, may not be burned in an incinerator subject to this Subpart unless that incinerator has been issued a permit pursuant to 6 NYCRR 380.

(c) Hazardous waste may not be burned in an incinerator subject to this Subpart unless that incinerator is exempt from or has been issued a permit pursuant to 6 NYCRR 373.

Section 219-3.8 Continuous emission monitoring. (a) Any person who owns or operates a facility subject to this Subpart must install, operate and maintain in accordance with manufacturer's instructions, instruments meeting specifications acceptable to the commissioner for continuously monitoring and recording the following emission and operating parameters:

(1) Primary combustion chamber exit temperature;

(2) Secondary (or last) combustion chamber exit temperature;

(3) Temperature leaving the particulate air cleaning device;

(4) Opacity; and

(5) Carbon monoxide for incinerators whose permitted charging rate is 500 pounds per hour or more.

Monitoring instruments for continuously measuring opacity will be subject to Performance Specification 1 set forth in Title 40 of the Code of Federal Regulations, Part 60, Appendix B.

Section 219-3.9 Stack testing. (a) Each facility subject to this Subpart must be tested while burning the normal waste to be incinerated in that facility, to demonstrate compliance with the standards in this Subpart. At a minimum, each incinerator must be tested at start-up and annually thereafter for particulates, hydrogen chloride, oxygen and carbon monoxide emissions. Additional testing will be at the discretion of the commissioner.

(b) A test protocol, including the configuration of breeching, stack and test port locations and test methods must be submitted for the commissioner's approval at least 30 days prior to stack testing.

(c) Witnessing of all stack tests by the commissioner's representative is required. Results of any stack test done in the absence of an approved protocol, or which is not witnessed, will not be accepted.

(d) Three copies of the stack test report must be submitted by the permittee to the commissioner within 60 days after completion of the tests, in accordance with 6 NYCRR 202.3.

Section 219-3.10 Data and calculations. Each application for a permit to construct a source of air contamination for a facility subject to this Subpart must include:

(a) Basic engineering data relative to the waste to be burned, incinerator design, combustion air, control devices and air cleaning devices; and

(b) An impact analysis using procedures acceptable to the commissioner.

Section 219-3.11 Operator training and certification.

(a) No facility subject to this Subpart will be permitted to operate until the applicant has submitted material that demonstrates to the satisfaction of the commissioner that the plant will at all times be operated under the direction of individuals who have received training necessary for proper operation of the entire facility.

(b) With the application for a certificate to operate, for a new or modified facility subject to this Subpart, the permittee must submit a description of an operator training program, including at least the following along with a time schedule for accomplishing training of all plant personnel:

(1) Proper operation and maintenance of equipment;

(2) Knowledge of environmental permit conditions and the impact of plant operations on any and all emissions;

(3) Interfacing with the public on the impact of plant operation on environmental concerns

(c) The on-site operation of any facility subject to these requirements must be directed at all times by a person(s) possessing an appropriate current New York State incinerator operator certification. This requirement is effective nine months after the date of the first qualifying examination approved by the commissioner.

(d) Operation includes, but is not limited to:

(1) Fuel preparation, storage, charging, combustion, heat extraction, combustion gas treatment; and

(2) Proper functioning of all mechanical and/or environmental control and monitoring equipment.

(e) This requirement does not eliminate the need for any person(s) involved with the facility from having to obtain any other required certificate(s) or license(s) necessary for the performance of their specific duties.

Section 219-3.12 Inspection and reporting. Each owner or operator of a permitted facility subject to these requirements must annually inspect that facility and submit a report to the commissioner, certifying that the condition and operation of that facility, including the calibration of all instrumentation, meet manufacturer's specifications. Such reports must be prepared by a qualified professional engineer, registered in New York State.

DRAFT PROPOSAL

A-1

New Subpart 219-1 is adopted to read as follows:

SUBPART 219-1

INCINERATION - GENERAL PROVISIONS

Section

219-1.1 Definitions
219-1.2 Summary of applicability

219-1.1 Definitions. (a) For the purpose of this Part and each of the Subparts of this Part, the general definitions of Part 200 of this Title apply.

(b) For the purpose of this Part, the following definitions also apply:

(1) Commercial waste. Solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities other than household and industrial waste.

(2) Dioxin equivalent. Any combination or mix of polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans containing from four to eight chlorine atoms which are expressed as 2,3,7,8 tetrachlorinated dibenzo-para-dioxin equivalents using current New York State Department of Health toxic equivalency factors. Standard conditions upon which these data are referenced are an absolute pressure of 760 mm mercury and 20° C at 7% oxygen.

(3) Incinerator. Any structure or furnace in which combustion takes place and type 0, 1, 2, 3, or 4 refuse is used as fuel, alone or in conjunction with fossil fuel.

(4) Infectious waste. Infectious waste means and includes the following:

(i) surgical waste, which consists of materials discarded from surgical procedures involving the treatment of a patient on isolation, other than patients on reverse or protective isolation;

(ii) obstetrical waste, which consists of materials discarded from obstetrical procedures involving the treatment of a patient on isolation;

(iii) pathological waste, which consists of discarded human tissues and anatomical parts which are discarded from surgery, obstetrical procedures, autopsy and laboratory procedures;

(iv) biological waste, which consists of discarded excretions, exudates, secretions, suctionings, and disposable medical supplies which have come in contact with these substances that cannot be legally discarded directly into a sewer and that emanate from the treatment of a patient on isolation, other than patients on reverse or protective isolation;

(v) discarded materials soiled with blood emanating from the treatment of a patient on isolation, other than patients on reverse or protective isolation;

(vi) all waste being discarded from renal dialysis, including tubing and needles;

(vii) discarded serums and vaccines that have not been autoclaved or returned to the manufacturer or point of origin;

(viii) discarded laboratory waste which has come in contact with pathogenic organisms and which has not been rendered noninfectious by autoclaving or other sterilization techniques;

(ix) animal carcasses exposed to pathogens in research, their bedding, and other waste from such animals that is discarded; and

(x) other articles that are being discarded that are potentially infectious and that might cause punctures or cuts, including intravenous tubing with needles attached, that have not been autoclaved or subjected to a similar sterilization technique and rendered incapable of causing punctures or cuts.

(5) Infectious waste incineration facility. An incinerator which is operated or utilized for the disposal or treatment of infectious waste, including combustion for the recovery of heat, a hich utilizes high temperature thermal destruction techno es.

Note: An infectious waste incineration facility may also burn other medical waste.

(6) Medical waste. Infectious waste and all other waste derived from the care of patients.

(7) Municipal solid waste. All materials or substances discarded from single and multiple family dwellings,

and other residential sources; similar types of materials from institutional, commercial and industrial sources; but not hazardous waste as defined in Part 371 of this Title or exclusive firing of sewage sludge.

(8) Municipal solid waste incineration facility. A facility that is owned, operated, or utilized by, or under contract with, a municipality or political subdivision and which utilizes high temperature thermal destruction technologies, including combustion for the recovery of thermal value or for the disposal of municipal solid waste.

Note: A municipal solid waste incineration facility may also be an infectious waste incineration facility.

(9) Private solid waste incineration facility. Any facility, other than a municipal solid waste facility, that burns municipal solid waste, or any fuels derived from municipal solid waste using thermal destruction technologies, with or without energy recovery.

(10) Refuse. All waste material, including but not limited to, garbage, rubbish, incinerator residue, street cleanings, dead animals, and offal. Refuse is classified in accordance with Table 1, Appendix 2*.

(11) Smoke. An air contaminant consisting of small gas-borne particles emitted by an air contamination source in sufficient number to be observable.

(12) Solid waste.

(i) Solid waste means all putrescible and non-putrescible materials or substances that are discarded or rejected as being spent, useless, worthless or in excess to the owners at the time of such discard or rejection, including but not limited to garbage, refuse, industrial and commercial waste, sludges from air or water treatment facilities, rubbish, tires, ashes, contained gaseous material, incinerator residue, construction and demolition debris, discarded automobiles and offal.

(ii) A material is discarded if it is abandoned by being:

(a) disposed of;

(b) burned or incinerated, including being burned as a fuel for the purpose of recovering usable energy; or

(c) accumulated, stored, or physically, chemically,

or biologically treated (other than burned or incinerated) instead of or before being disposed of.

(iii) A material is disposed of if it is discharged, deposited, injected, dumped, spilled, leaked, or placed into or on any land or water so that such material or any constituent thereof may enter the environment or be emitted into the air or discharged into groundwater or surface water.

(iv) The following materials are not solid waste for the purposes of this Part:

(a) domestic sewage;

(b) any mixture of domestic sewage and other wastes that passes through a sewer system to a publicly owned treatment works for treatment;

(c) industrial wastewater discharges that are actual point source discharges subject to permit under ECL Article 17. Industrial wastewaters while they are being collected, stored, or treated before discharge, and sludges that are generated by industrial wastewater treatment are solid wastes and are regulated by this Part;

(d) irrigation return flows;

(e) radioactive materials which are source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended, 42 USC 2011 et seq. (see subdivision 360-1.3 of this Title); and

(f) materials subject to in-situ mining techniques which are not removed from the ground as part of the extraction process.

219-1.2 Summary of applicability. (a) Subpart 219-2, "Municipal and Private Solid Waste Incineration Facilities."

(1) Subpart 219-2 applies to all new municipal or private solid waste incineration facilities, or modifications of such sources, for which a permit to construct is issued pursuant to Part 201 of this Title, 120 days or more after the effective date of this Part.

(2) Subpart 219-2 applies statewide.

(3) Any incineration facility subject to Subpart 219-2 is exempt from the requirements of Subparts 219-5 and 219-6 of this Part.

(4) Any incineration facility subject to Subpart 219-2 must also comply with Subpart 219-3 when burning infectious waste.

(b) Subpart 219-3, "Infectious Waste Incineration Facilities."

(1) Subpart 219-3 applies to all incinerators used for the incineration of infectious waste or medical waste.

(2) Subpart 219-3 only applies if the total charging rate, as limited by a permit to construct or certificate to operate issued pursuant to Part 201 of this Title, is less than 50 tons per day.

(3) Subpart 219-3 applies statewide.

(c) Subpart 219-4, "Incinerators, Crematories."

(1) Subpart 219-4 applies to all facilities constructed or installed or for which an application for a permit to construct was received by the commissioner after the effective date of this Part, used for the cremation of human and animal bodies, body parts and for the incineration of associated bedding.

(2) Subpart 219-4 applies statewide.

(d) Subpart 219-5, "Existing Incinerators."

(1) Subpart 219-5 applies to incinerators constucted or installed or which had been issued a permit to construct prior to the effective date of this Part.

(2) Subpart 219-5 applies statewide except in New York City or Westchester and Nassau Counties.

(e) Subpart 219-6, "Existing Incinerators-New York City, Nassau and Westchester Counties."

(1) Subpart 219-6 applies to incinerators constructed or installed or which had been issued a permit to construct prior to the effective date of this Part.

(2) Subpart 219-6 only applies in New York City and Westchester and Nassau Counties.

*See Appendix 2, infra.

(Appendix 2 remains unchanged.)

(This page left blank)

APPENDIX C

Existing State Regulations

(This page left blank)

PART 218
VEHICLES PROPELLED BY DIESEL ENGINES

(Effective May 1, 1972; May 10, 1981)

Section 218.1 Applicability. This Part shall apply to all vehicles propelled by a diesel engine, excluding marine vessels.

218.2 Prohibitions. (a) No person who owns, operates or leases a vehicle propelled by a diesel engine or who owns, leases or occupies land and has actual or apparent dominion or control over the operation of a vehicle propelled by a diesel engine which is present on said land, shall operate said vehicle or allow or permit it to be operated, in such a manner that exhaust emissions of a shade of blue, black or grey equal to or greater than Number 1 on the Ringelmann chart or equivalent standard acceptable to the Commissioner are produced for a continuous period of more than five seconds when the vehicle is in motion.

(b) No person who owns, operates or leases a bus or truck, the motive power for which is provided by a diesel engine or who owns, leases or occupies land and has the actual or apparent dominion or control over the operation of a bus or truck present on such land, the motive power for which said bus or truck is provided by a diesel engine, shall allow or permit the diesel engine of such bus or truck to idle for more than five consecutive minutes when the bus or truck is not in motion, except as otherwise permitted by section 218.3.

218.3 Exceptions. The prohibitions of subdivision (b) of Section 218.2 shall not apply when:

(a) A bus or truck is forced to remain motionless because of traffic conditions over which the operator thereof has no control.

(b) Regulations adopted by federal, state or local agencies having jurisdiction require the maintenance of a specific temperature for passenger comfort. The idling time specified in subdivision (b) of section 218.2 may be increased but only to the extent necessary to comply with such regulations.

(c) A diesel engine is being used to provide power for an auxiliary purpose, such as loading, discharging, mixing or processing cargo; controlling cargo temperature; construction; lumbering; oil or gas well servicing; farming; or when operation of the engine is required for the purpose of maintenance.

(d) Fire, police and public utility trucks or other vehicles are performing emergency services.

(e) Trucks owned or operated by persons engaged in mining and quarrying are used within the confines of such persons' property.

(f) A truck is to remain motionless for a period exceeding two hours, and during which period the ambient temperature is continuously below twenty-five degrees Fahrenheit.

PART 219
INCINERATORS

(Effective May 1, 1972)

Section 219.1 Title. These rules shall be known as the New York State rules to prevent air pollution from incinerators.

219.2 Applicable geographical area. This Part shall apply to the entire State of New York.

219.3 Definitions. (a) Incinerator. Any structure or furnace in which combustion takes place and type 0, 1, 2, 3, or 4 refuse is used as fuel, alone or in conjunction with fossil fuel.

(b) Refuse. All waste material, including but not limited to, garbage, rubbish, incinerator residue, street cleanings, dead animals, and offal. Refuse is classified in accordance with Table 1, Appendix 2.

(c) Smoke. An air contaminant consisting of small gas-borne particles emitted by an air contamination source in sufficient number to be observable.

219.4 Emission limits. (a) All incinerators having a capacity of 2,000 lb/hr or less and built and installed after January 1, 1968, shall be designed, built, installed and operated to meet the emission limits of figure 1*.

(b) No incinerator larger than 2,000 lb/hr capacity and built after January 1, 1970, shall be operated so as to produce particulate emissions which exceed the amount shown in figure 1*.

(c) No incinerator having a capacity of 2,000 lb/hr or less and built or installed between April 1, 1962, and January 1, 1968, shall be operated so as to produce particulate emissions which exceed 0.5 lb/hr for every 100 lb/hr of refuse charged, unless a final order by the commissioner provides otherwise.

(d) Any incinerator having a capacity of 2,000 lb/hr or less and built or installed prior to April 1, 1962, shall either meet the requirements of 219.4(c) or shall be equipped with adequate control devices or redesigned and rebuilt so as to meet the requirements of 219.4(a) by January 1, 1969.

(e) No incinerator larger than 2,000 lb/hr capacity and built between April 1, 1962, and January 1, 1970, shall be operated so as to produce particulate emissions which exceed 0.5 lb/hr for every 100 lb/hr of refuse charged, unless a final order by the commissioner provides otherwise.

(f) Any incinerator larger than 2,000 lb/hr capacity and built prior to April 1, 1962, shall either meet the requirements of 219.4(e) or shall be equipped with adequate control devices or redesigned an rebuilt so as to meet the requirements of 219.4(b) by January 1, 1970.

219.5 Smoke emissions. (a) No incinerator, built or installed after January 26, 1967, regardless of size, shall emit smoke of an opacity denser than 20 percent or No. 1 of the Ringelmann chart or equivalent, under normal operating conditions.

(b) No incinerator built or installed prior to January 26, 1967, regardless of size, shall be operated so as to emit smoke of an opacity denser than 40 percent or No. 2 of the Ringelmann chart or equivalent, under normal operating conditions.

219.6 Tests. (a) All incinerators larger than 2,000 hr/lb capacity shall be tested using isokinetic sampling techniques in accordance with test procedures acceptable to the commissioner.

(b) All incinerators built or installed after January 1, 1968, and having a capacity of 2,000 lb/hr or less shall be tested in

*See Appendix 2.

accordance with special test procedures promulgated by the commissioner. Units which are representative models may be tested instead of an actual installation, in accordance with special test procedures promulgated by the commissioner.

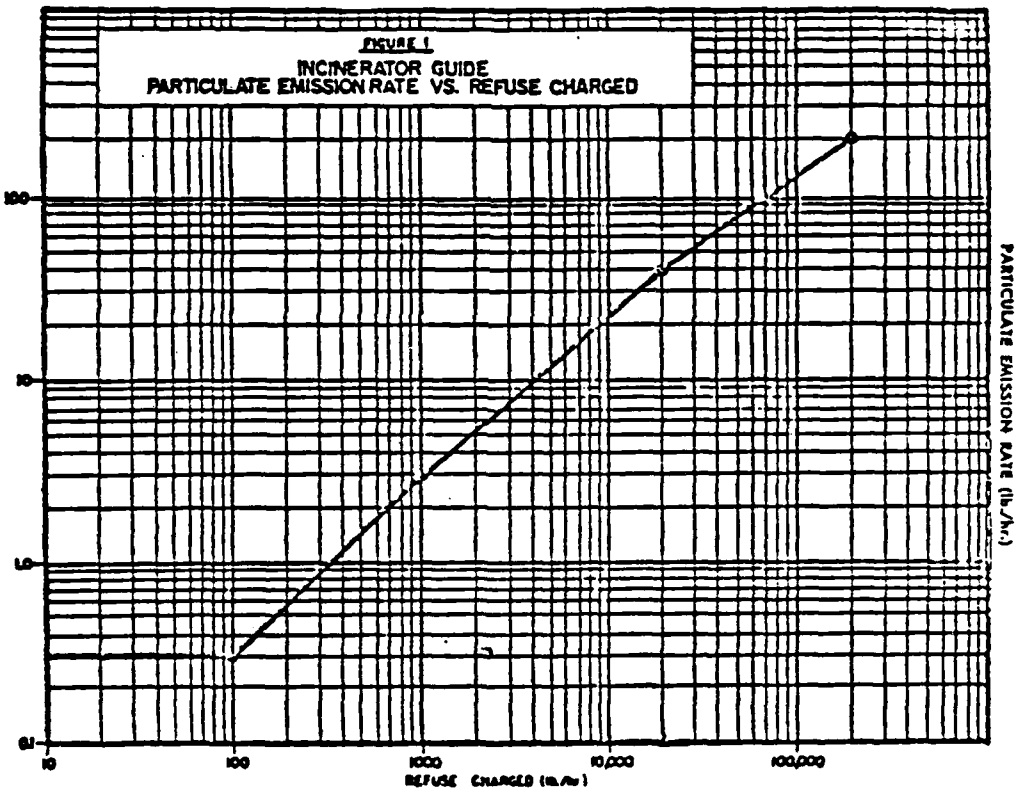
219.7 Abatement. (a) Where the commissioner has reason to believe that an incinerator installation is violating the emissions standards of section 219.4, he may have tests conducted. The owner shall provide, at his expense, sampling holes and pertinent allied facilities as needed, at the request of the commissioner.

(b) If such tests indicate a contravention of the emission limits, the commissioner may require the installation of appropriate control equipment or he may seal the incinerator if such equipment is not installed within the time limit specified by the commissioner.

(c) The commissioner may order the cleaning, repair, replacement or alteration of any equipment or control equipment which causes or is operated so as to cause a violation of this Part.

(d) The commissioner may order a change in the manner of operation of any incinerator which is operated so as to cause a violation of this Part.

APPENDIX 2



APPENDIX 2

TABLE 1

Classification of Refuse

(1) Type	(2) Principal Components	(3) Approximate Composition % by Weight	(4) Approximate Moisture Content % by Weight	(5) Approximate Incombustible Solids % by Weight	(6) Approximate B.T.U. per Pound of Refuse
0	Rubbish consisting of highly combustible materials such as paper, wood and cardboard including up to 10% treated papers, rags, plastic or rubber from commercial and industrial sources	Rubbish 100%	10%	5%	8500
1	Some garbage but primarily rubbish consisting of combustible material such as paper, cardboard, wood, combustible floor sweepings from residential, commercial and industrial sources	Rubbish 80% Garbage 20%	25%	10%	6500
2	Rubbish and garbage from residential sources	Rubbish 50% Garbage 50%	50%	7%	4300
3	Some rubbish, but primarily garbage consisting of animal and vegetable matter from restaurants, hotels, markets, institutional and commercial sources	Garbage 65% Rubbish 35%	70%	5%	2500
4	Human and animal solid refuse consisting of carcasses and organs from hospitals laboratories, abattoirs, animal pounds and similar sources	100% animal and Human Tissue	85%	5%	1000
5	Gaseous, liquid or semi-liquid refuse from processes such as tar, paints, solvents and chemical sludge	Variable	Dependent on predominant components	Variable	Variable
6	Solid or semi-solid refuse from processes such as rubber, plastics, wood and sewage sludge.	Variable	Dependent on predominant components	Variable	Variable

PART 220
PORTLAND CEMENT PLANTS
(Effective March 16, 1973; May 10, 1984)

Section 220.1 Definitions. (a) For the purpose of this Part, the general definitions of Part 200 of this Title apply.

(b) For the purpose of this Part, the following definitions also apply:

(1) Dry process portland cement plant. A portland cement plant where the raw material kiln feed entering the kiln in a powder form has a moisture content of one percent or less by weight.

(2) Feed to the kiln. The weight of all materials, excluding fuels and uncombined water, introduced into the kiln during the time when a stack sample is being taken to determine compliance with sections 220.2 and 220.3 of this Part.

(3) Upset condition. Any unavoidable

(This page left blank)

APPENDIX D

Sampling Port Location

(This page left blank)

DETERMINATION OF MINIMUM NUMBER OF TRAVERSE POINTS

Stack ID: PATHOLOGICAL INCINERATOR Stack diameter at ports: 0.96 (ft)

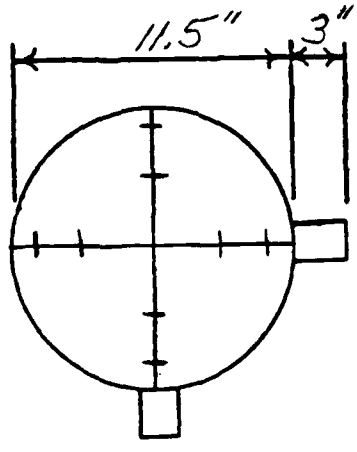
Distance A (ft) 3.83 (duct diameters) 4

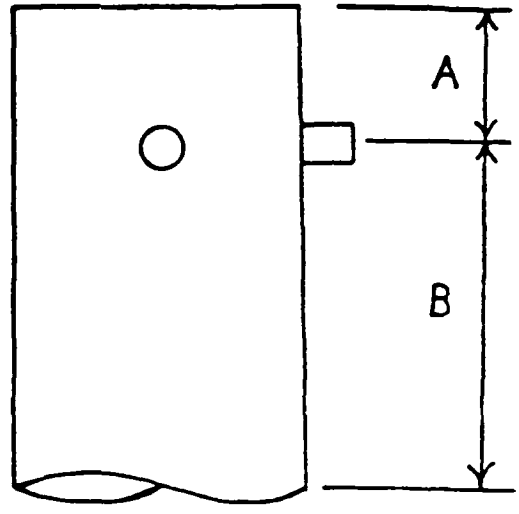
Recommended number of traverse points as determined by distance A: 8

Distance B (ft) 11.5 (duct diameters) 12

Recommended number of traverse points as determined by distance B: 8

Number of traverse points used: 8





(This page left blank)

APPENDIX E

Sampling Date and Calculations Run 1

(This page left blank)

****

S O U R C E T E S T R E P O R T

SOURCE :
GRIFFISS AFB INCINERATOR

GRIFFISS AFB, NY 13441

DEVICE TESTED : PATHOLOGICAL INCINERATOR

DATE TESTED : 11 DEC 87

SUBMITTING AGENCY :
USAFOEHL/ECQ

BROOKS AFB, TX 78235

****

****

T E S T T R A V E R S E P O I N T L O C A T I O N

STACK DIAM. (in.) = 11.5
STACK RADIUS (in.) = 5.75
STACK DIAM. (ft.) = .9583333
STACK AREA (ft. sq) = .7213113

POINT #	DISTANCE in.
1	.3713675
2	1.204226
3	2.228859
4	3.717068
5	7.782933
6	9.271141
7	10.29577
8	11.12863

THE ABOVE DISTANCES PROCEED FROM THE TEST PORT ACROSS THE
TRAVERSE TO THE OPPOSITE WALL OF THE STACK.
THESE DISTANCES SHOULD BE ROUNDED OFF TO THE NEAREST 1/4 INCH.
THIS IS THE LIMITING ACCURRCY OF AN EPA METHOD 5 PROBE.

STANDARD CONDITIONS (TEMP. AND PRESSURE)

STD.TEMP (deg. F) = 68
STD.TEMP (deg. R) = 528
STD. PRESSURE (in. HG) = 29.92

****

***** R U N # 1 *****

H U M I D I T Y D A T A

ALL TEMPS INPUT IN DEGREES FAHRENHEIT AND CONVERTED TO deg. K
AMBIENT DRY BULB (deg. K) = 276.4833
AMBIENT WET BULB (deg. K) = 275.9278
SOURCE ALTITUDE (AMSL) (ft) = 504

DEW POINT = 35.74854 deg. F
VAPOR PRESSURE (in. HG) = .2092778
SATURATION VAPOR PRESS. (in. HG) = .2285187
RELATIVE HUMIDITY (%) = 91.58019
SPECIFIC HUMIDITY (pp1000) = 4.438305

M E T E R D A T A P R O G R A M

OF TEST POINTS = 16
AMBIENT PRESS. (in. HG) = 28.875

POINT #	TEMP IN deg. F	TEMP OUT deg. F	AVG TEMP deg. F	Delta H in. H2O
1	38	38	38	1.83
2	41	39	40	1.98
3	45	39	42	2.11
4	49	40	44.5	2.12
5	51	41	46	1.91
6	52	42	47	1.95
7	54	49	51.5	1.63
8	54	44	49	1.62
9	52	45	48.5	2.14
10	54	46	50	2.1
11	55	46	50.5	2.09
12	57	47	52	2.15
13	58	48	53	1.75
14	59	49	54	1.79
15	60	49	54.5	1.38
16	59	49	54	1.32

FINAL AVG. METER TEMP (deg. R) = 508.4063
DELTA H@ VALUE = 2.11
FINAL AVG. METER PRESS. (in. HG) = 29.01227

****

H 2 O T E S T D A T A

START METER READING = 743.553
END METER READING = 785.096
TOTAL CONDENSATE VOL (ml) = 38.58
H2O VAPOR GAS VOLUME @ STP = 1.828692
TOTAL METER GAS VOL (uncorrected cu ft) = 41.54303
AVG. METER TEMP (deg. R) = 508.4063
TOTAL DRY SAMPLE VOL (CF @ STP) = 41.83515
MOLE FRACTION DRY AIR = .9581189
% H2O BY VOL = 4.188115

G A S D E N S I T Y

% CO2 = 3.33
% O2 = 16.43
% CO }
% N2 } = 80.24

GAS DENSITY = .9921018

DRY MOL. WT. = 29.19

****

S O U R C E T E S T D A T A

NOZZLE DIAM (in.) = .375
NOZZLE AREA (in. sq.) = 7.669898E-04
PITOT FACTOR = .84
ATMOS. PRESS (in. HG) = 28.875
STACK PRESS (in. HG) = 28.88
TEST START TIME = 935

	PT/DELTA P in. H2O	TS/TM deg R	VELOCITY ft/sec	DELTA H in. H2O	TIME MINS
1	0.190	1172.0 / 498.0	37.1	1.83	4.0
2	0.200	1154.0 / 500.0	37.8	1.98	4.0
3	0.200	1088.0 / 502.0	36.7	2.11	4.0
4	0.195	1062.0 / 504.5	35.8	2.12	4.0
5	0.175	1058.0 / 506.0	33.9	1.91	4.0
6	0.175	1042.0 / 507.0	33.6	1.95	4.0
7	0.145	1040.0 / 511.5	30.6	1.63	4.0
8	0.145	1040.0 / 509.0	30.6	1.62	4.0
9	0.185	1004.0 / 508.5	33.9	2.14	4.0
10	0.185	1024.0 / 510.0	34.3	2.10	4.0
11	0.185	1032.0 / 510.5	34.4	2.09	4.0
12	0.190	1036.0 / 512.0	34.9	2.15	4.0
13	0.155	1037.0 / 513.0	31.6	1.75	4.0
14	0.155	1018.0 / 514.0	31.3	1.79	4.0
15	0.120	1020.0 / 514.5	27.5	1.38	4.0
16	0.115	1020.0 / 514.0	27.0	1.32	4.0

TOTAL METER VOLUME = 41.54303
AVG. STACK TEMP (deg. R) = 1052.938
AVG. STACK VEL (ft/sec) = 33.18588
AVG. STACK VEL (ft/min) = 1991.153
AVG. METER TEMP (deg. R) = 508.4063
AVG. METER DELTA H (in. H2O) = 1.866875
AVG. METER PRESSURE (in. HG) = 29.01227
TOTAL MINS OF TEST = 64
STACK ACFM = 1436.241
STACK DSCFM = 665.945

****

I S O K I N E T I C A N A L Y S I S

TOTAL CONDENSATE VOLUME (ml) = 38.58
AVERAGE STACK TEMPERATURE (deg. R) = 1052.938
TOTAL METER GAS VOL (uncorrected CF) = 41.54303
AVG METER TEMP (deg. R) = 508.4063
BAROMETRIC PRESSURE (in. HG) = 28.875
AVG PRESSURE DROP ACROSS ORIFICE METER (in. H20) = 1.866875
AVG. STACK VEL (ft/min) = 33.18588
STACK PRESSURE (in. HG) = 28.88
TOTAL MINUTES OF TEST = 64
NOZZLE AREA (ft. sq.) = 7.669898E-04
DRY GAS METER CALIBRATION FACTOR = 1.082

ISOKINETIC RATE FOR THIS RUN = 99.54372 %

P A R T I C U L A T E E M I S S I O N R A T E

INITIAL FILTER WT. (gms) = 0
FINAL FILTER WT. (gms) = .0669
SAMPLE WT. (gms) = .0669
SAMPLE VOL. (DSCFM) = 41.83515
CONCENTRATION (gms/DSCF) = 2.467463E-02
% CO2 = 3.33
CONCENTRATION @ 12% CO2 (gms/DSCF) = .0889176
STACK DSCFM = 665.945
PM EMISSIONS (stk conds) (lb/hr) = .1408382
PM EMISSIONS (@ 12% CO2) (lb/hr) = .5075252

******* END OF ANALYSIS FOR RUN # 1 *******

****

PRELIMINARY SURVEY DATA SHEET NO. 1

(Stack Geometry)

BASE: GRIFFISS	PLANT: LOCP I.C
DATE: 11 DEC 87	SAMPLING TEAM:
SOURCE TYPE AND MAKE:	
SOURCE NUMBER:	INSIDE STACK DIAMETER: ~~13.5~~ 11.5 Inches
RELATED CAPACITY:	TYPE FUEL:
DISTANCE FROM OUTSIDE OF NIPPLE TO INSIDE DIAMETER: ~~8~~ Inches	
NUMBER OF TRAVERSES:	NUMBER OF POINTS/TRAVERSE: ~~8~~ 1

LOCATION OF SAMPLING POINTS ALONG TRAVERSE

POINT	PERCENT OF DIAMETER	DISTANCE FROM INSIDE WALL (Inches)	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)
1		5	~~5.7~~ 8.8
2		9	~~9.4~~ 10.7
3		0	~~16.1~~ 16.6
4		0	18.6 13.7
OUTLET DUCT			
	5.1 ± ✓		
	5.1 ✓		

OEHL FORM 15 APR 78

PRELIMINARY SURVEY DATA SHEET NO. 2

(Velocity and Temperature Traverse)

BASE: Griffiss AFB	DATE:
BOILER NUMBER: Packaged Incinerator	
INSIDE STACK DIAMETER: 11.5	Inches
STATION PRESSURE: 28.875	In Hg
STACK STATIC PRESSURE: 0.035	In H20
SAMPLING TEAM:	

TRAVERSE POINT NUMBER	VELOCITY HEAD, V_p IN H20	$\sqrt{V_p}$	STACK TEMPERATURE (°F)
4	~~.08~~ .185	32	
3	~~.075~~ .19	32	460
2	~~0.06~~ .175	31	
1	~~0.045~~ .16	30	
		31	
actual dia 11.03 in			
.3723			
.375, .325, .375			
AVERAGE			

17 lb/hr **PARTICULATE SAMPLING DATA SHEET**

RUN NUMBER: Run #1

DATE: 11/5/82

PLANT: Hoof Hill

BASE: Craft-155

SAMPLE BOX NUMBER: RAC

METER BOX NUMBER: Dilbert

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

2.3

leak check @ 5" Hg — zero leak

2 min/pt

EQUATIONS

$^{o}R = {}^{o}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

t = 64 min

d = .375 .375/.3

Stop 785.096

Start 743.553

AMBIENT TEMP: °F

STATION PRESS: 28.375 in Hg

HEATER BOX TEMP: °F

PROBE HEATER SETTING:

PROBE LENGTH: in

NOZZLE AREA (A): .375 sq ft

Cp: .84

DRY GAS FRACTION (Fd): ~5%

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
4	0255	.135 3	612		.125	1.83	743.553	33		39	241	46
	4	4	614		.12	1.98		41		39	256	46
3	8	4	628		.12	2.11		45		39	256	43
	12	4	620		.195	2.12		47		40	257	45
2	16	4	593		.175	1.91		51		41	259	48
	20	4	582		.175	1.95		52		42	259	43
1	24	4	580		.145	1.63		54		44	259	60
	28	4	556		.145	1.67		54		44	259	50
	32						764.421					
X	00	5	544		.135	2.17		52		45	256	57
	4	5	560		.135	2.10		54		46	251	64
3	8	5	522		.154	2.09		55		46	254	64
	12	5	526		.19	2.15		57		47	260	64
2	16	5	517		.155	1.75		58		48	259	62
	20	5	554		.155	1.79		58		47	263	62
1	24		560		.12	1.38		60		49	265	62
	28		560		.115		+1.32	59		49	270	
	32						785.096					

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
GRIFFISS AFB		#1

BUILDING NUMBER	SOURCE NUMBER

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.3013	0.2873	0.0140
ACETONE WASHINGS (Probe, Front Half Filter)	98.8394	98.7865	0.0529
BACK HALF (If needed)			
	Total Weight of Particulates Collected		0.0669 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	109	100	9
IMPINGER 2 (H20)	109.5	100	9.5
IMPINGER 3 (Dry)	1		1
IMPINGER 4 (Silica Gel)	220.6	201.52	19.08
	Total Weight of Water Collected		gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	3.2	3.4	3.4		3.33
VOL % O_2	16.6	16.3	16.4		16.45
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

APPENDIX F

Sampling Data and Calculations Run 2

(This page left blank)

****

***** R U N # 2 *****

H U M I D I T Y D A T A

ALL TEMPS INPUT IN DEGREES FAHRENHEIT AND CONVERTED TO deg. K
AMBIENT DRY BULB (deg. K) = 279.8167
AMBIENT WET BULB (deg. K) = 278.4278
SOURCE ALTITUDE (AMSL) (ft) = 504

DEW POINT = 38.75566 deg. F
VAPOR PRESSURE (in. HG) = .235323
SATURATION VAPOR PRESS. (in. HG) = .2877726
RELATIVE HUMIDITY (%) = 81.77393
SPECIFIC HUMIDITY (pp1000) = 4.992337

M E T E R D A T A P R O G R A M

OF TEST POINTS = 16
AMBIENT PRESS. (in. HG) = 28.875

POINT #	TEMP IN deg. F	TEMP OUT deg. F	AVG TEMP deg. F	Delta H in. H2O
1	47	47	47	1.75
2	52	48	50	1.76
3	55	48	51.5	1.92
4	58	49	53.5	1.95
5	60	50	55	1.75
6	61	51	56	1.62
7	62	52	57	1.25
8	62	53	57.5	1.25
9	60	53	56.5	1.87
10	62	54	58	1.8
11	64	55	59.5	1.92
12	65	55	60	1.93
13	68	57	62.5	1.77
14	68	57	62.5	1.78
15	69	58	63.5	1.57
16	69	59	64	1.57

FINAL AVG. METER TEMP (deg. R) = 517.125
DELTA H@ VALUE = 2.11
FINAL AVG. METER PRESS. (in. HG) = 29.0012

****

H 2 O T E S T D A T A

START METER READING = 785.319
END METER READING = 825.286
TOTAL CONDENSATE VOL (ml) = 40.85
H2O VAPOR GAS VOLUME @ STP = 1.93629
TOTAL METER GAS VOL (uncorrected cu ft) = 39.96704
AVG. METER TEMP (deg. R) = 517.125
TOTAL DRY SAMPLE VOL (CF @ STP) = 39.5544
MOLE FRACTION DRY AIR = .9533319
% H2O BY VOL = 4.666807

G A S D E N S I T Y

% CO2 = 2.23
% O2 = 17.77
% CO }
% N2 } = 80

GAS DENSITY = .9862209

DRY MOL. WT. = 29.0676

****

S O U R C E T E S T D A T A

NOZZLE DIAM (in.) = .375
NOZZLE AREA (in. sq.) = 7.669898E-04
PITOT FACTOR = .84
ATMOS. PRESS (in. HG) = 28.875
STACK PRESS (in. HG) = 28.88
TEST START TIME = 1140

PT/DELTA P in. H20	TS/TM deg R	VELOCITY ft/sec	DELTA H in. H20	TIME MINS
1 / 0.180	1190.0 / 507.0	36.5	1.75	4.0
2 / 0.175	1158.0 / 510.0	35.5	1.76	4.0
3 / 0.185	1127.0 / 511.5	36.1	1.92	4.0
4 / 0.185	1114.0 / 513.5	35.8	1.95	4.0
5 / 0.165	1107.0 / 515.0	33.7	1.75	4.0
6 / 0.150	1091.0 / 516.0	31.9	1.62	4.0
7 / 0.115	1085.0 / 517.0	27.9	1.25	4.0
8 / 0.115	1085.0 / 517.5	27.9	1.25	4.0
9 / 0.170	1070.0 / 516.5	33.7	1.87	4.0
10 / 0.165	1083.0 / 518.0	33.4	1.80	4.0
11 / 0.175	1083.0 / 519.5	34.4	1.92	4.0
12 / 0.175	1079.0 / 520.0	34.3	1.93	4.0
13 / 0.160	1077.0 / 522.5	32.8	1.77	4.0
14 / 0.160	1070.0 / 522.5	32.7	1.78	4.0
15 / 0.140	1068.0 / 523.5	30.5	1.57	4.0
16 / 0.140	1068.0 / 524.0	30.5	1.57	4.0

TOTAL METER VOLUME = 39.96704
AVG. STACK TEMP (deg. R) = 1097.188
AVG. STACK VEL (ft/sec) = 32.97942
AVG. STACK VEL (ft/min) = 1978.765
AVG. METER TEMP (deg. R) = 517.125
AVG. METER DELTA H (in. H20) = 1.71625
AVG. METER PRESSURE (in. HG) = 29.0012
TOTAL MINS OF TEST = 64
STACK ACFM = 1427.306
STACK DSCFM = 631.9383

****

I S O K I N E T I C A N A L Y S I S

TOTAL CONDENSATE VOLUME (ml) = 40.85
AVERAGE STACK TEMPERATURE (deg. R) = 1097.188
TOTAL METER GAS VOL (uncorrected CF) = 39.96704
AVG METER TEMP (deg. R) = 517.125
BAROMETRIC PRESSURE (in. HG) = 28.875
AVG PRESSURE DROP ACROSS ORIFICE METER (in. H2O) = 1.71625
AVG. STACK VEL (ft/min) = 32.97942
STACK PRESSURE (in. HG) = 28.88
TOTAL MINUTES OF TEST = 64
NOZZLE AREA (ft. sq.) = 7.669898E-04
DRY GAS METER CALIBRATION FACTOR = 1.082

ISOKINETIC RATE FOR THIS RUN = 99.14286 %

P A R T I C U L A T E E M I S S I O N R A T E

INITIAL FILTER WT. (gms) = 0
FINAL FILTER WT. (gms) = .0397
SAMPLE WT. (gms) = .0397
SAMPLE VOL. (DSCFM) = 39.5544
CONCENTRATION (gms/DSCF) = .0154868
% CO2 = 2.23
CONCENTRATION @ 12% CO2 (gms/DSCF) = 8.333704E-02
STACK DSCFM = 631.9383
PM EMISSIONS (stk conds) (lb/hr) = 8.388181E-02
PM EMISSIONS (@ 12% CO2) (lb/hr) = .451382

******* END OF ANALYSIS FOR RUN # 2 *******

****

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: #3
DATE: 11 Dec 87
PLANT: Imp IIIC
BASE: Griffiss
SAMPLE BOX NUMBER: RAC
METER BOX NUMBER: Nutech
Qw/Qm:
Co:

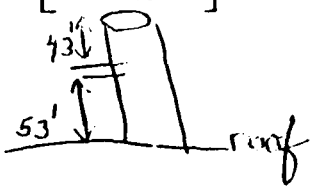
SCHEMATIC OF STACK CROSS SECTION

leak check - zero leak @ 5" Hg

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$



t = 64 min

AMBIENT TEMP: °F
STATION PRESS: 29.95 in Hg
HEATER BOX TEMP: °F
PROBE HEATER SETTING:
PROBE LENGTH: in
NOZZLE AREA (A): .3125 sq ft
Cp: .84
DRY GAS FRACTION (Fd): 1.0

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
4	1140	-.085	730		.18	1.75	785.319	47		47	235	43
	4	3	693		.175	1.76		52		48	242	43
3	8	4	667		.185	1.92		55		48	250	48
	12	4	654		.185	1.75		58		49	255	52
2	16	5	617		.165	1.75		60		50	263	57
	20	5	631		.15	1.62		61		51	263	61
1	24	5	611		.115	1.36 1.25		62		52	266	62
	28	5	625		.115	1.25		62		53	269	64
	32						820.0	60				
4		5	610		.17	1.87		60		53	247	64
	4	5	623		.165	1.30		62		54	252	64
3	8	5	622		.175	1.92		64		55	266	66
	12	5	619		.175	1.93		65		55	270	66
2	16	5	617		.16	1.77		68		57	273	67
	20	5	610		.16	1.78		68		57	273	67
1	24	5	608		.14	1.57		67		58	273	67
	28	5	603		.14	1.57		69		59	273	67
	32						825.286					

OEHL FORM 18 MAY 78

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
GRISSOM AFB		#2

BUILDING NUMBER	SOURCE NUMBER

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.3045	0.2876	0.0169
ACETONE WASHINGS (Probe, Front Half Filter)	105.3942	105.3714	0.0228
BACK HALF (If needed)			
	Total Weight of Particulates Collected		0.0397 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	109	100	9
IMPINGER 2 (H20)	111	100	11
IMPINGER 3 (Dry)	1	0	1
IMPINGER 4 (Silica Gel)	325.5	205.65	19.85
	Total Weight of Water Collected		40.85 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	2.3	2.2	2.2		2.23
VOL % O_2	17.7	17.8	17.8		17.77
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

OEHL FORM MAY 78 20

APPENDIX G

Sampling Data and Calculations Run 3

(This page left blank)

****

***** R U N # 3 *****

H U M I D I T Y D A T A

ALL TEMPS INPUT IN DEGREES FAHRENHEIT AND CONVERTED TO deg. K
AMBIENT DRY BULB (deg. K) = 279.8167
AMBIENT WET BULB (deg. K) = 278.7055
SOURCE ALTITUDE (AMSL) (ft) = 504

DEW POINT = 39.86429 deg. F
VAPOR PRESSURE (in. HG) = .2456354
SATURATION VAPOR PRESS. (in. HG) = .2877726
RELATIVE HUMIDITY (%) = 85.35744
SPECIFIC HUMIDITY (pp1000) = 5.211806

M E T E R D A T A P R O G R A M

OF TEST POINTS = 16
AMBIENT PRESS. (in. HG) = 28.875

POINT #	TEMP IN deg. F	TEMP OUT deg. F	AVG TEMP deg. F	Delta H in. H2O
1	62	63	62.5	1.9
2	66	62	64	1.84
3	68	63	65.5	1.91
4	71	64	67.5	2
5	72	64	68	1.81
6	73	65	69	1.79
7	74	65	69.5	1.36
8	74	66	70	1.37
9	72	67	69.5	1.84
10	73	67	70	1.82
11	73	67	70	1.98
12	74	68	71	1.97
13	75	68	71.5	1.65
14	75	68	71.5	1.67
15	76	68	72	1.23
16	77	69	73	1.23

FINAL AVG. METER TEMP (deg. R) = 529.0313
DELTA H@ VALUE = 2.11
FINAL AVG. METER PRESS. (in. HG) = 29.00079

****

H 2 0 T E S T D A T A

START METER READING = 825.482
END METER READING = 865.872
TOTAL CONDENSATE VOL (ml) = 26.1
H20 VAPOR GAS VOLUME @ STP = 1.23714
TOTAL METER GAS VOL (uncorrected cu ft) = 40.39002
AVG. METER TEMP (deg. R) = 529.0313
TOTAL DRY SAMPLE VOL (CF @ STP) = 39.07282
MOLE FRACTION DRY AIR = .9693093
% H20 BY VOL = 3.069068

G A S D E N S I T Y

% CO2 = 4
% O2 = 15.6
% CO }
% N2 } = 80.4

GAS DENSITY = .998905

DRY MOL. WT. = 29.264

****

S O U R C E T E S T D A T A

NOZZLE DIAM (in.) = .375
NOZZLE AREA (in. sq.) = 7.669898E-04
PITOT FACTOR = .84
ATMOS. PRESS (in. HG) = 28.875
STACK PRESS (in. HG) = 28.88
TEST START TIME = 1337

PT/DELTA P in. H20	TS/TM deg R	VELOCITY ft/sec	DELTA H in. H20	TIME MINS
1 / 0.185	1160.0 / 522.5	36.3	1.90	4.0
2 / 0.185	1206.0 / 524.0	37.1	1.84	4.0
3 / 0.185	1164.0 / 525.5	36.4	1.91	4.0
4 / 0.190	1147.0 / 527.5	36.6	2.00	4.0
5 / 0.170	1133.0 / 528.0	34.4	1.81	4.0
6 / 0.165	1117.0 / 529.0	33.7	1.79	4.0
7 / 0.125	1108.0 / 529.5	29.2	1.36	4.0
8 / 0.125	1108.0 / 530.0	29.2	1.37	4.0
9 / 0.165	1087.0 / 529.5	33.2	1.84	4.0
10 / 0.165	1100.0 / 530.0	33.4	1.82	4.0
11 / 0.180	1103.0 / 530.0	35.0	1.98	4.0
12 / 0.180	1106.0 / 531.0	35.0	1.97	4.0
13 / 0.150	1106.0 / 531.5	32.0	1.65	4.0
14 / 0.150	1092.0 / 531.5	31.8	1.67	4.0
15 / 0.110	1089.0 / 532.0	27.2	1.23	4.0
16 / 0.110	1089.0 / 533.0	27.2	1.23	4.0

TOTAL METER VOLUME = 40.39002
AVG. STACK TEMP (deg. R) = 1119.688
AVG. STACK VEL (ft/sec) = 32.97141
AVG. STACK VEL (ft/min) = 1978.285
AVG. METER TEMP (deg. R) = 529.0313
AVG. METER DELTA H (in. H20) = 1.710625
AVG. METER PRESSURE (in. HG) = 29.00079
TOTAL MINS OF TEST = 64
STACK ACFM = 1426.959
STACK DSCFM = 629.4647

****

I S O K I N E T I C A N A L Y S I S

TOTAL CONDENSATE VOLUME (ml) = 26.1
AVERAGE STACK TEMPERATURE (deg. R) = 1119.688
TOTAL METER GAS VOL (uncorrected CF) = 40.39002
AVG METER TEMP (deg. R) = 529.0313
BAROMETRIC PRESSURE (in. HG) = 28.875
AVG PRESSURE DROP ACROSS ORIFICE METER (in. H20) = 1.710625
AVG. STACK VEL (ft/min) = 32.97141
STACK PRESSURE (in. HG) = 28.88
TOTAL MINUTES OF TEST = 64
NOZZLE AREA (ft. sq.) = 7.669898E-04
DRY GAS METER CALIBRATION FACTOR = 1.082

ISOKINETIC RATE FOR THIS RUN = 98.44884 %

P A R T I C U L A T E E M I S S I O N R A T E

INITIAL FILTER WT. (gms) = 0
FINAL FILTER WT. (gms) = .0429
SAMPLE WT. (gms) = .0429
SAMPLE VOL. (DSCFM) = 39.07282
CONCENTRATION (gms/DSCF) = 1.694137E-02
% CO2 = 4
CONCENTRATION @ 12% CO2 (gms/DSCF) = .0508241
STACK DSCFM = 629.4647
PM EMISSIONS (stk conds) (lb/hr) = 9.140107E-02
PM EMISSIONS (@ 12% CO2) (lb/hr) = .2742032

******* END OF ANALYSIS FOR RUN # 3 *******

****

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: #3

DATE: 11 Dec 91

PLANT: Hospital

BASE: Coffee

SAMPLE BOX NUMBER: RAC

METER BOX NUMBER: Nutech

Qw Qm

Co

SCHEMATIC OF STACK CROSS SECTION

leak check @ 6" Hg zero leak

EQUATIONS

$^{o}R = {}^{o}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

t = 64 min

AMBIENT TEMP: °F

STATION PRESS: 28.75 in Hg

HEATER BOX TEMP: °F

PROBE HEATER SETTING

PROBE LENGTH: in

NOZZLE AREA (A): .375 sq ft

Cp: .84

DRY GAS FRACTION (Fd): 95%

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
4	1337	5	700		.185	1.70	825.482	63		63	267	46
	4	5	746		.185	1.84		66		62	267	46
3	8	5	702		.185	1.91		69		63	261	42
	12	5	687		.19	2.00		71		64	252	50
2	16	5	693		.17	1.81		72		64	248	53
	20	5.5	657		.165	1.79		73		65	248	54
1	24	5	617		.125	1.36		74		65	248	54
	28	5	643		.125	1.37		74		66	249	56
4	32	6	627		.165	1.31	836	72		67	244	65
	4	6	640		.165	1.85		73		67	243	65
3	8	6	643		.18	1.98		73		68	266	65
	12	6	646		.12	1.91		74		68	274	65
2	16	6	646		.15	1.65		75		68	272	64
	20	6	632		.12	1.67		75		69	273	65
1	24		629		.11	1.35		76		68	259	63
	28		629		.11	1.23		77		69	260	63
							865.872					

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
GRIFFISS AFB		#3

BUILDING NUMBER	SOURCE NUMBER

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.3030	0.2882	0.0148
ACETONE WASHINGS (Probe, Front Half Filter)	96.3014	96.2733	0.0281
BACK HALF (If needed)			
	Total Weight of Particulates Collected		0.0429 gm

II. WATER

Std .5 .6 wt

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	~~109~~ 102	100	2
IMPINGER 2 (H20)	112	100	12
IMPINGER 3 (Dry)	0	0	0
IMPINGER 4 (Silica Gel) 246.5 tare 27.65	218.85	206.75	12.10
	Total Weight of Water Collected		26.10 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	4.0	4.0	4.0		4.0
VOL % O_2	15.6	15.6	15.6		15.6
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

OEHL FORM 20 MAY 78

APPENDIX H

Calibration Data

(This page left blank)

METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 28 Oct 87 Meter box number Nutech

Barometric pressure, P_b = 29.575 in. Hg Calibrated by Daly + Fagin

Orifice manometer setting (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F/°R	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Avg[a] (t_d), °F	Time (θ), min	Y_i	$\Delta H@_i$ in. H_2O
VAC in Hg									
6 0.5	5	4.672	74 74 534	79 75	75 73	535.5	13.4	1.072	2.056
6 1.0	5	4.684	73 74 533.5	85 81	78 76	540	9.6	1.078	2.096
6 1.5	10	9.376	73 74 533.5	90 86	81 78	543.75	15.7	1.083	2.067
6 2.0	10	9.4	73 73 533	93 91	83 81	547	13.8	1.086	2.126
6 3.0	10	9,441	73 73 533	97 95	86 84	550.5	11.3	1.086	2.126
6 4.0	10	9,433	74 73 533.5	99 98	88 87	553	9.9	1.088	2.171
							Avg	1.082	2.11

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t + 460)}$	$\Delta H@_i = \frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w} \right]^2$
0.5	0.0368		
1.0	0.0737		
1.5	0.110		
2.0	0.147		
3.0	0.221		
4.0	0.294		

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number 1 Date 12 Feb 88 Meter box number Nutech Plant Griffiss + Plattsburgh

Barometric pressure, P_b = 29.70 in. Hg Dry gas meter number 6840593 Pretest Y 1.082

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F/°R	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F/°R	Time (θ), min	Vacuum setting, in. Hg	Y_i	$\frac{Y_i \cdot V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1.1	10	9.329	76 / 76 536	84 / 80	78 / 76	79.5 / 539.5	18.07	13	1.076	
1.1	10	9.347	76 / 76 536	87 / 84	81 / 79	82.75 / 542.75	18.1	13	1.080	
1.1	10	9.370	76 / 76 536	88 / 87	82 / 81	84.5 / 544.5	18.1	13	1.081	
									Y = 1.079	

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y $\pm$0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

NOZZLE CALIBRATION DATA FORM

Date 11 Dec 88 Calibrated by M Daly

Nozzle identification number	Nozzle Diameter[a]			ΔD,[b] mm (in.)	D_{avg}[c]
	D_1, mm (in.)	D_2, mm (in.)	D_3, mm (in.)		
0.375	0.375	0.375	0.375	0.000	0.375

where:

[a] $D_{1,2,3}$, = three different nozzles diameters, mm (in.); each diameter must be within (0.025 mm) 0.001 in.

[b] ΔD = maximum difference between any two diameters, mm (in.), $\Delta D \leq$ (0.10 mm) 0.004 in.

[c] D_{avg} = average of D_1, D_2, and D_3.

ANALYTICAL BALANCE CALIBRATION FORM

Balance name See Below Number _____

Classification of standard weights Class S weights

Date	0.500 g	1.0000 g	10.0000 g	50.0000 g	100.0000 g	Analyst
Mettler PT 1200 9 Nov 87	0.47	0.97	9.97	49.98	99.97	
Triple Beam Balance 22 Nov 87	0.504	—	10.01	—	100.02	
11 Dec 87	0.60	—	—	—	—	
Mettler AE163 10 Nov 87	0.4999	1.0000	10.0002	50.0009	100.0017	
12 Nov 87	0.5000	1.0001	10.0003	—	—	
31 Dec 87		1.0000	9.9998	—	99.9972	
2 Jan 88	0.1000	1.0000	9.9996	—	99.9964	
3 Jan 88	0.1000	1.0000	9.9997	—	99.9965	
4 Jan 88	0.1000	—	—	—	99.9964	
5 Jan 88	0.1000	—	—	—	99.9963	

APPENDIX I

Temperature and Loading Rate

(This page left blank)

GRIFFISS AFB PATHOLOGICAL INCINERATOR

TEMPERATURE AND LOADING RATES

TIME (hrs)	TEMPERATURE (degrees Fahrenheit)	LOAD (lb)
0933	1000	13
0946	1400	
1000	1275	
1020	1300	
1042	1200	
1137	1200	14
1223	1400	
1335	1700	23
1400	1500	

(This page left blank)

DISTRIBUTION LIST

	Copies
HQ AFSC/SGPB Andrews AFB DC 20334-5000	1
HQ USAF/SGPA Bolling AFB DC 20332-6188	1
HQ SAC/SGPB Offutt AFB NE 68113-5001	1
USAF Regional Medical Center Wiesbaden/SGB APO New York 09220-5300	1
OL AD, USAFOEHL APO San Francisco 96274-5000	1
USAFSAM/TSK Brooks AFB TX 78235-5301	1
Defense Technical Information Center(DTIC) Cameron Station Alexandria VA 22319	2
HSD/EV Brooks AFB TX 78235-5501	1
HQ USAF/LEEV Bolling AFB DC 20330-5000	1
HQ AFESC/RDV Tyndall AFB FL 32403-6001	1
HQ SAC/DE Offutt AFB OH 68113-5001	1
USAF Hospital Griffiss/SGPB Griffiss AFB NY 13441-5300	5

SUPPLEMENTARY

INFORMATION

DEPARTMENT OF THE AIR FORCE
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235-5501

29 JUN 1988

REPLY TO ATTN OF: ECQ (1Lt Attebery, Autovon 240-2891)

SUBJECT: Addendum to USAFOEHL Report 88-095EQ0079FEF, Source Emission Testing of Hospital Pathological Incinerator, Griffis AFB, NY.

TO: See Distribution

Recently, we noticed an error in the report referenced above. This involved the method of calculation for correcting emission data to 7 percent oxygen. These corrections as well as the associated verbiage changes are attached. While these changes do not effect compliance with existing State of New York emission standards, particulate emissions are not in compliance with the proposed revisions. We hope these changes do not cause any undue hardship.

HD A198 134

DENNIS R. SKAIKA, LtCol, USAF, BSC
Chief, Consultant Services Division

1 Atch

Corrections to USAFOEHL Report 88-095ECQ0079FEF

1. Change Table 2. Griffiss AFb Incinerator Particulate Emission Results on page 7, 4th column, entitled "uncorrected (gr/dscf)" to read:

0.0247
0.0155
0.0169

0.0190

2. Change Table 2. Griffiss AFB Incinerator Particulate Emission Results on page 7, 5th column, entitled "corrected (gr/dscf @ 7% O2)" to read:

0.0819
0.0938
0.0466

0.0741

3. Change Table 2. Griffiss AFB Incinerator Particulate Emission Results on page 7, 6th column, entitled "Emission (lb/hr)" to read:

Emissions
(uncorrected)
(lb/hr)

4. Change Table 2. Griffiss AFB Incinerator Particulate Emission Results on page 7, 7th column, entitled "Meet Standard exist/interim" to read:

Y/N

5. Change page 6, III. Conclusions, paragraph 1 to read:

... are shown in Table 1. Results indicate that the incinerator particulate emission rate of .105 lb/hr was well below the existing emission standard. However, the concentration, 0.0741 gr/dscf, does not meet the proposed interim standard of 0.015 gr/dscf. Table 2 shows...

ATTN A

PROJECT CRITIQUE

This response sheet is provided to help us improve our service to you. Your confidential answers will be used by the Consultant Services Division Chief to identify the strengths and weaknesses of our products and services.

Project No: 88-095EQ0079FEF

Project Title: Source Emission Testing of Hospital Pathological Incinerator, Griffis AFB, NY

	Inadequate	Meager	Satisfactory	Excellent
1. Content (Did the report respond to your question?)				
2. Timeliness (Considering the complexity of the report and field survey requirements, was our response consistent with your needs?) Interim Response: Final Report:				
3. Recommendations (Were the recommendations - appropriate and supported by the conclusions?)				
4. Charts, Figures, Graphs and Tables (Did these enhance or clutter the report?)				
5. Clarity (Could you understand the report?)				
6. Project Officer (Professional, competent, courteous)				

COMMENTS: (Please provide any additional comments you believe will help us improve our service. Use this section to expand any Inadequate or Meager blocks.)

To return, fold over, staple, and drop in outgoing mail.

OEHL/EC
Brooks AFB TX 78235-5501